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FOREWORD

A new science, in order that it may live and grow, must have an atmosphere of active thought from which it may breathe in its sustenance. It is the mutual give and take of workers that keeps alive the spirit and the interest amidst the monotony of the daily routine. Signs are not wanting from which we may justly infer that Psychology as a science is gradually taking to soil in our academic life. A journal at this stage would help to create not only the necessary thought environment but also a medium through which students of Psychology in the different parts of India would come into touch with one another. We further hope that this journal will serve as the channel for the interchange of data and ideas between the psychologists in India and those outside. We solicit the co-operation of every one interested in the Science of Psychology.

EDITORS

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INDIAN JOURNAL OF PSYCHOLOGY

Psychology, Its Present Development and Outlook

N. N. SENGUPTA, M.A., PH.D. ¹¹⁰/₂₂₋₂₉

GENTLEMEN,

I am keenly sensible of the honour in being called upon to preside over the deliberations of this distinguished assembly of psychologists and I am grateful to my colleagues, from far and near, for the kind help, advice and encouragement that I have received. It is an historic occasion for us, since it is the first meeting of its kind in India. We all fondly hope that this fair promise of the inception of the Psychological section, will, as years roll by, fulfil itself in gathering a rich harvest for the science we serve.

Ours is an era of crisis in the life history of Psychology. The familiar landmarks of concepts and schools are rapidly vanishing in the debris of the obsolete; new thoughts flash forth from all sides; new methods proclaim themselves; and new outlooks and attitudes peep out from every cargo of materials pouring in from the different quarters. There has been, as Professor Münsterberg used to say, a "bewildering progress."

The student of Psychology to-day observes with satisfaction a general awakening of interest in the methods and results of Psychology in all centres of culture. Facts that

see their day in the laboratories, quickly find their way out of the academic walls and freely circulate in newspapers and parlours with the easy grace of science popularised. The discoveries in Abnormal Psychology, we all know, exercise a peculiar fascination over the mind of all classes of population ; but I was surprised, not long ago, to read in a novel, an admirable resumé of Cannon's researches on emotion which help the detective-hero to solve a rather impossible problem. I congratulated the novelist and his hero as well as the psychologist. After all, the process of socialisation fairly indicates the place of a science in the culture of the people.

It is John Locke, I think, who is responsible for the contrast between the real world and the ideas of mind. Mental states have undoubtedly been topics of interest in all ages, not only to philosophers but also to laymen. But mind, in the popular belief, has rarely figured in this modern world, as a causal factor in the chain of events. It has been viewed by the hard-headed common-sense, in our age of science, as we view a benevolent idiot,—good but negligible. The recent years, however, have worked a change in this settled attitude. The benevolent idiot is suddenly found to possess power and fortune and is potent for good and evil. All eyes turn to him, and there is a rapid search for his sphere of influence. Such has been the lot of Psychology. There has come about, in the course of the last decade a realisation that mind, in whatever way you may define it, is a determinative factor in the realm of inter-relation of living beings. And hence we see an effort to estimate from the different phases of organic life, the specific influence of mind,—to carry on a survey from the standpoint of Psychology.

This tendency is so manifest to-day in every sphere in which mind may have a plausible rôle to play, that we are justified in speaking of *Psychology as a thought-movement, as a Weltanschauung* that transcends in its significance the *special science of Psychology*. The concept of evolution postulated

for the explanation of a special set of facts, not only transformed biology but developed into the thought movement and philosophy of evolutionism. Psychology likewise promises to develop into psychologism, against which we are beginning to hear warnings in sociology as well as in the study of primitive life.

The objectivism of the 19th century science consisted in the consideration of human events, individual and social, in abstraction from their mental context. The psychological movement of to-day insists that mind, defined in its widest sense, is a positive determinant of the activities and inter-relations of psycho-physical beings;—to ignore it, thus, is to leave a lacuna in the chain of causation that would falsify the most carefully calculated prediction.

The attitude is unmistakable in almost every field of human culture. The student of social sciences almost unconsciously assumes to-day a psychological point of view. The studies of the sympathy school, those of Tarde, Durkheim, Espinas and Wundt stand out as but episodes in the history of sociology, and the general run of views, a few years back, could hardly be called psychological. But the rise of the instinct-school, the investigations into special types of group-life, and above all, the actual formation of new groups, and disintegration of the old ones, have contributed to the development of Social Psychology which, from the mass of the daily accumulating data, promises to crystallise before long into a well defined science.

The study of racial characters and culture types had long been in the hands of casual observers and travellers. The growth of the science of anthropology gradually revealed the need of a more thorough-going analysis of facts. The early studies of Wundt and of Durkheim brought to light the possibilities of the application of Psychology to the investigation of ethno-psychic characteristics. And the researches of Rivers and his colleagues and the psycho-analytic

interpretations of Freud, have brought ethnic facts within the direct purview of Psychology. The student of anthropology too has not been slow to appreciate the new line of thought as evidenced by the works of Malinowski and others. And the publication of a number of psychological investigations of the primitive culture is a happy augury of the infusion of the psychological attitude in anthropology.

Political science likewise, has had its psychologists among its early preceptors. But the psychological theory in such cases was largely a pretext for preaching a particular branch of political philosophy, as instanced by Hobbes or Rousseau. The basic notions of political life, imbedded in traditions, like justice, or equality, says a recent thinker, are abstract and futile, because they do not conform to the restive human nature. Political science, then should be studied, so the idea runs, in the light of the changing patterns of human mind. And this new angle of vision is to be found in the writings of Graham Wallas, Lipmann, Lowell and Rivers.

Economics in the same manner, had developed a definitely psychological attitude. It has always been a science based upon human motives, of a particular colour and configuration. But the concrete human urges have been concealed behind the heavy mass of economic institutions and the white heat of economic strife. The altered outlook in social matters, however, has led the economist too, to re-evaluate the inner factors that determine the course of economic events.

Education has always claimed to ground itself upon the basic nature of mind. But the guiding conceptions in the past though professing to be psychological, have really been the outcome of the philosophical affiliation of the educational thinker. Moreover, the method has primarily been deductive; the usual thing is to infer the probable course of a particular capacity from the general theory of mind. The present age

seems to be one in which we perceive a vast amount of effort for the elucidation of the concrete nature of the mind of the learner by direct observation and experiment; and this is coupled with an attempt to analyse the course as well as the limits of each particular capacity involved in the process of education. We may rightly say then, that the educationist has accepted the point of view of Psychology in right earnest and in the true scientific spirit.

And we cannot but feel proud of the achievement of our science in the humane mission of healing. The vast development in Psychiatry in the last few years as well as in the decade preceding the war clearly indicates the branching off of Psychology in a well-defined direction. The psycho-analytic movement, in its theoretic and practical aspects, opens up large vistas the end of which cannot yet be seen. Yet its stand upon a psychic causal nexus, its distinctly psychological method and procedure, have contributed in no small measure to the propagation of the psychological attitude of which it itself is a product.

Let us pass on to another phase of social life. The criminal has always been a social problem as well as a subject of social interest. The attention to-day seems to have shifted from the daring of the criminal act to the intricacies of the criminal motive, and from the physiognomy to the mental characteristics of the criminal. In fact it may not be too much to claim that the effort to reorganise the prison life on a sane and sound basis, so evident in the Western world, is the outcome of the appreciation of the psychological point of view.

And the same cause explains the social care bestowed upon the human misfits, and the organised interest evinced in their welfare. The rise of the institutions for the mentally deficient, and of the special hospitals for mental maladies, the general desire for the cultural uplift of the socially down trodden bespeak of a humanitarianism that has its basis in a

manifest interest in the mental life; it is a consequence of the psychological thought movement.

It is not necessary to trace any further ramifications in order to show how the science of Psychology has expanded itself into a cultural atmosphere. Like evolutionism that spelt 'open sesame' to many a closed entrance of life, the psychological movement too, carries large possibilities for the solution of many perplexing human problems. An expansion of this nature produces in the beginning a certain loss of scientific rigour, and a looseness in method. But it means, in the long run, a much greater gain for the science in the shape of vast details of data and of the awakened social interest.

If we turn from this gratifying fact of the pervading character of the psychological attitude, of popular enthusiasm for Psychology, to the currents and cross currents of actual scientific thought, we are at first bewildered in the mass and variety of conflicting principles, theories, and schools. An analysis of the trends of thought, however, readily brings to light the truth that ours is an epoch which marks a definite point of departure; it is the meeting point of the old order, just passing away and of a new one slowly arising.

The most striking feature of the work of the last generation lies in the heroic effort at giving a portrait of mind as a unitary whole with well-defined laws, constituents and tendencies. They tried to fit in all the rich materials gathered in their pioneer endeavour, into a finished system, in which there might be gaps to be filled but there is no uncertainty with respect to the general outlines. Such is the impression that one gathers from the works of the psychologists of the Leipzig school as well as from those of the Functional school.

Contrast this impression with that gathered from the writings of Titchener, Myers, Wirth and Ebbinghaus who belong to the same generation as Wundt, Külpe and Münsterberg. Contrast it further with the impression that you form from a survey of the investigations in Psychology

as published in the journals during the last decade. You come across a rich variety of data ; you meet with an earnest probing into the nature of each mental state. But you are warned of gulfs unsounded and voids unfilled at every step ; and there is hardly any attempt at placing a complete map of mind before you—a map with well-defined boundaries and configurations.

The tendency to systematisation is undoubtedly a necessity of scientific thought. But the character of the system must be revealed by the data ; it turns futile when speculation usurps the place of observation. Most of the systems with which we are familiar to-day, however, appear to follow from a philosophical rather than from a scientific necessity. The Apperception school, the Empathy school, the schools of Functional Psychology, all have their ultimate basis in a more or less explicit epistemological doctrine. And the psychological studies of to-day represent a healthy reaction against this tendency. We are proceeding to a deeper understanding of each particular mental state ; but the picture of the mind as totality seems to have lost much of its charm.

Another marked transformation has taken place in the psychological forum of to-day. A review of the psychological literature of two or three decades ago would bring to light a purely descriptive spirit. You begin with the tripartite classification of capacities ; you assign each mental state to its proper class ; and you end with the idea that all the three functions are interrelated. The foundation of such systems lay in metaphysics and epistemology that infused a certain amount of philosophic interest in the otherwise dry skeleton of classified terms.

Galton's studies in ideational type, the analysis of reaction times of various orders, James and Lange's contribution to the study of emotion, Wundt, Müller and Ribot's explanation of attention, the studies in optical illusion and Stumpf's studies in tonal fusion—these mark the transition from the

stage of description to a definite programme of explanatory Psychology. A review of the literature again would show how the descriptive and the explanatory programmes have been reconciled in the combination of the two types of study. The last decade however has brought in another transformation in psychological thought. We are developing from the stage of explanation into that of prediction which is the normal end of all sciences.

The application of mental tests for the determination and prediction of the course of mental life has long been known. The history of the problem will, in all probability, be lost in that of the scholastic examinations and initiatory ceremonies. But so far as the present age is concerned it suffices for us to begin with Seguin, with the work of Binet and Simon, with that of De Sanctis. The negative purpose, the rating of intelligence with a view to eliminate the deficient, which underlies the early formulation of the tests, has in the course of the last decade, developed into the positive, the determination of the Intelligence Quotient in order to predict the possibilities of normal intelligence. Similarly, the early industrial tests of Münsterberg were mainly eliminative in character. Their main principle was to place the individual in a concrete vocational situation reconstructed in miniature. Success and failure to respond to the different features of the situation, to perform the different tasks demanded by them, represented the score. The higher scores under such conditions do not necessarily imply a higher ability ; only the lower scores, the failures, possess the diagnostic significance. The measurement in these instances was in terms of the situation and not in terms of particular mental capacities called forth in the reactions. The natural transition, then, was to the tests of the essential mental capacities, of attention, of quickness of reaction, of sensory acuity, etc., involved in the different vocational conditions. The reconstructed situation represented a combination of stimuli to evoke the different psychophysical

processes. And, there was an effort to graduate the stimuli in such a manner as to have a set of scores with small gradations all of which could have a diagnostic value. And this transformation laid the basis of vocational tests.

But these early vocational tests sink into insignificance in comparison with those developed during the world-war. If you look through the first few volumes of the *Journal of Applied Psychology*, you will be struck with the fact that almost every capacity brought into play in our daily avocations has been tested and correlated more or less satisfactorily with achievements. I must confess that the volume of the tests is no measure of their value, that we do not know in many cases exactly which capacity is tested, that the method of scoring, shows so much variation between one investigator and another, that it itself ought to form a topic of *Differential Psychology*. But these are matters of detail that a greater thoroughness of study would bring into perfection. The extent to which these tests have proved satisfactory indicates the limit of scientific prediction in *Psychology*. We are, of course, given to prediction of our fellow-being's behaviour in our every-day life. But that is merely empirical and varies with the amount of our experience of human nature. What the psychologists attempt to-day is the prediction that every natural science aims at.

The course of development that we have so far traced, can only follow upon a general agreement upon the scaffolding of the principal facts of mental life. This certainly lies on the credit side of the age just over. The general course of memory, the characteristic phenomena of perception, the principal facts of attention and action—these and many others are the typical problems and results that have come down to us from the last generation. The special tendency in the laboratory work of to-day seems to be to study, not the typical features of mental processes, not the broad and essential character of attention or of memory, but to

emphasise the capacities as conditioned by particular stimuli. We study thus memory as determined by a particular sensory quality, or attention evoked in a concrete everyday situation. The generalised mental states seem to have disappeared behind their actual specially conditioned phenomena. There is to be no elimination of features, no simplification of a mental operation in order to employ it as a type representing a whole class of phenomena ; each mental operation is to be studied in its concrete setting. And as a consequence, we are falling back more and more upon the method of correlation. Two or more mental states can be classed together, only if the factors into which each is analysed, resemble. You arrive at a type thus not through conceptual construction or intellectual abstraction but through a correlation of the factors, into which they are analysed.

The outcome of this development is obvious. The familiar concepts that have served as landmarks in psychological studies, are disintegrating into a large number of different psychic functions. The concepts of intelligence, of instinct or of memory can hardly be employed as simple unitary operations without rousing a vigorous polemical warfare.

The concept of instinct which has been one of the storm-centres of Psychology in all ages, has been in the past decade and in the present the butt-end of a considerable turmoil of theories. Its psychic fringe of pre-perception, its immanent teleology, its correlation with feelings and even its character as a unitary functional whole—all have been challenged. We do not know where we are—or, rather every one seems to know where he himself is but does not know where the other fellow stands. The concept of intelligence has likewise disintegrated. The experiments on animal behaviour, point to one notion of intelligence ; the mental tests proceed upon another ; the vocational tests upon a third ; and the Psychology of thought processes upon a fourth. You cannot reduce one to the other without a considerable interpretative

manceuvre. The ability to form association which underlies the experiments on animal behaviour are far remote from that indicated by the Intelligence Quotient ;—and the vocational tests indicate a specificity of intelligence for each vocation, so that one with a small score in one series of tests may possibly rank high in another. The concept of memory likewise has disintegrated into special memories. The memory types and each particular phase of memory seem to possess their own property. And before long we may have a controversy over the question whether there is a general memory-factor just as we have to-day over the question of general intelligence factor. In fact, we should expect such a discussion about each familiar mental state, if our reading of the situation be correct. We are passing through an epoch of a radical change in the fundamental notions, of the melting of the familiar concepts.

This process of dissolution speaks well of the analytic spirit of the age. It is necessary that the ideas of mind borrowed mostly from our everyday life should be thoroughly tested by analysis and Psychology of to-day seems to have taken it up in right earnest. But at the same time, we realise that this analysis gives us but the elements ; the laws of their combination have yet to be discovered. The past generation of psychologists, Wundt, Stumpf, Külpe, Lipps and Münsterberg, made us familiar with some of the ways in which the mental elements come together. Fusion, assimilation, complication, colligation, successive association, apperception—these are the modes of combination that still pass current. Very little work has been done for the past decade or so, in fact, nothing since the days of the system-makers. Yet, it is a problem that lies at the very foundation of Psychology.

The only noteworthy contribution in this direction is that of Freud. The concepts of translation, secondary elaboration, projection, dramatisation, identification and

condensation represent some of the modes in which the psychic factors come together. The dynamic view underlying Freud's terminology, may present an apparent difficulty in bringing these in line with the older concepts. But there is, I am convinced, no insuperable difficulty, it is true that some of this, like secondary elaboration or condensation may well be subsumed under the older concepts of fusion. It remains, however, an interesting problem how the others may be assimilated in the general scheme of the present day Psychology. It is only when we have a fairly comprehensive scheme of combination of the psychic factors that we shall be in a position to understand the nature of the complex mental processes.

I must, before I pass on, draw your attention to the conception of *pattern* which promises to be useful in the absence of any more precise idea. We are, as I have said, still groping for the exact relation between the constituents of complex mental states. But we can easily discover their general arrangement, as the focal and the marginal, as the preparatory and the consummatory, as the implicit and the explicit, or as the preceding and the succeeding. These relations may easily be represented into patterns. And the different psychic states may, thus conveniently be described as specific patterns of particular constituents. In the absence of a precise understanding of the ultimate laws of combination, the concept is likely to prove useful for descriptive purposes.

The psychological thought of the day seems to have crystallised into three schools or standpoints, the structural, the functional and the behaviouristic. The difference between the three has been discussed almost *ad nauseum* and psychologists seem to have agreed to differ. The issues between the schools are extremely complex in their nature; validity of the introspective method, the reality of mental activity, the possibility of analysing complex processes into simple psychic elements,—the differences upon these and many other

questions have conspired to give rise to this diversity of stand-points. Yet the language of the controversy has a peculiarly epistemological sound and is liable to produce the impression that there is nothing more in it than the habitual squabble of philosophers. Whether mind in its ultimate conception is a stream of psychic elements, combining into multiform complexes, whether it is a persistent series of teleological acts realising themselves in images, ideas and feelings, or whether it should be defined in terms of objectively observable motor responses, are questions that are sure to rest upon the ultimate philosophical predilections.

But the issue between the schools seems to me to have a direct bearing upon the method of handling the data that we are daily called upon to sift. Wundt, we know, had a similar question before him in his attempt to develop the doctrine of apperceptive function. Apperception, for Wundt, is a composite, so to speak, of Will and Attention. It has been Wundt's effort to show in every sphere of mental life, that action and attention are the ever-present determinants of the psychic processes. You cannot eliminate them, nor can you explain your data without calculating their influence. Thus he arrives at the conclusion that mind is essentially an apperceptive system. We may not agree with Wundt's conclusion but his method gives us a fruitful suggestion as to how the methodological value of the three schools may be tested; for, in the present stage of our knowledge, it is their importance in this direction that principally concerns us.

I should, thus, like to present the issue in a different form: suppose that we have a series of data representing the changes of a psycho-physical state under a set of varying conditions. Can we explain these changes in terms of the varying properties of a relatively simple set of psycho-physical factors? If the answer be in the affirmative, there is nothing against our accepting the structural view. Or, is it necessary to assume any specific kind of mental act, or the activity of the

mind as a whole in order to explain any definite change in a mental state? If the answer be in the affirmative, our sympathies should be with one or the other form of functionalism. Or again, can the data be sufficiently explained in terms of the laws of the responses that directly yield the data? For instance, can the data of memory be accounted for in terms of the laws of the repetitive and the reproducing motor-processes? If so, we subscribe to behaviourism. These answers do not solve the whole question at issue between the three schools; the theoretic implication of the standpoints carries us back to the problem of the interconnection of mental states; but they certainly offer a better substitute than speculation.

We cannot ignore in this connection the contribution of the psycho-analytic school. The more or less abstract hypothesis of the unconscious has undoubtedly been brought into a concrete significance in the work of Freud. The real determinants of inter-relation and variation of psychophysical states, according to this school, are in the unconscious. Can this view be affiliated to either of the schools we have been discussing? Is it more akin to behaviourism, as is sometimes asserted? How far the Psychology based upon psycho-analysis corresponds to any of the existing standpoints is a question that yet awaits investigation.

Side by side this clash of theories and conflict of methods, a fruitful approach to the problem of mental life has gradually been opened up through cumulative researches in many different sciences. Traditional culture has taught men in all ages to regard mind as undetermined or affected by psychic influences alone. Both of these notions have been in all ages and climes associated, with a certain fringe of mysticism that has stubbornly stood in the way of a rational inquiry into the nature of mind. But at the same time the gathering of scientific experience from different sources, has forced upon the student of mental life the view that mind unfolds as a focus of

operation of a complex set of determinants. A clear conception of the nature and function of these determinants has so far been shaded in obscurity partly through a lack of confirmatory data and partly through certain metaphysical difficulties, such as the question of interaction of body and mind. But many lines of investigation have converged to-day to invest these determinants with a concrete significance.

One of the most important determinants is the factor of heredity. It has of course long been believed that the individual mind is determined to a great or less extent by the hereditary factor. But the development of the science of genetics has brought home to us the precise nature of the operation of the hereditary factors. Ideational type, synaesthesia, peculiarities of intelligence and action, as well as emotivity, are all supposed to bear the indelible mark of heredity. We owe this advance to the researches in Abnormal Psychology no less to the study of racial characters.

In the same manner, the manifold ways in which the bodily system is related to mental states, have been broadly understood from time immemorial. The researches in neurology beginning with those of Gall, Spurzheim, Flourens, and the studies in aphasia commencing from Bouilland (1825) MarcDax (1836) and Broca (1861) have served to impress upon the general cultured opinion the intimate relation between the peripheral and the central nervous system and the mental processes. The tendency in the early days was to seek for a central factor for psychoses. But the latter-day attitude is to look for a correlation not with the central but with the peripheral factors. The investigations in space perception, those in attention, and time perception clearly bring to light this change in attitude. Another noticeable phase of research has been to determine the influence of the different bodily organs upon the mental life. The James-Lange theory of emotion attempted to show the way in which the visceral and the vascular systems may

be regarded as determinants of the mental life. The researches of Cannon have likewise shown the connection between the emotive changes and the secretions of the adrenal gland. The investigations in the arrests of development and in mental deficiency have similarly brought to focus the significance of the glandular system as a whole upon the course of the mental changes. And, the efforts of the psychoanalytic school clearly prove the importance of the reproductive system. The bodily processes as determinants of psychic processes, thus, have acquired a new concretion and meaning.

The psychoanalytic school has invested two other factors with a richer meaning than heretofore—the psychic history of the individual and the social environment. It has undoubtedly been recognised all along that the unconscious history of the mental life from its early beginnings, is a determinant of any particular psychosis. But the precise mechanism was yet to be discovered; and the hypothesis of the subconscious was brought to a state of lucidity, now and then, through studies like those of Binet, Prince and Sidis. It had waited for Freud to discover the *modus operandi* of the hypothetical unconscious and thus to render the concept significant. The rôle of the social environment in the life-cycle of the individual mind, has, in a similar way, been a subject of speculation of the moral philosopher and of the theologian. The exact nature of the influence was but abstractly conceived in the past. But the nature of the inhibitions exercised by the human environment upon the individual, the play and interplay of the emotive tendencies, the fixation of the diverse action attitudes, have only recently been unearthed by the patient researches of the psychoanalytic school. And the consequence is a more precise understanding of the interaction of the social factors and the individual mind.

No less important is the change in our attitude towards the physical stimulus. The earlier conception of the

stimulus arose principally from the experimental studies in sensation. Consequently the stimulus was conceived as a definable and relatively simple feature of an object operating upon the sense-organ. The extension of the experimental method in the other fields of mind soon led to the application of complex forms of stimuli, which could still be defined in terms of the relations of constituent factors to one another. Such for instance are the stimuli employed in the investigation of temporal and spatial perceptions, in the experiments on fusion, where the different features of the complex stimuli used, bear definite relations to one another. The investigations in memory and attention lead us a step further. The stimuli employed may still be regarded as units with multiple features, each conditioning the process of stimulation in a particular way. But the resulting psychic processes in these instances, do not vary in a simple manner with the quality, intensity, duration, space relation, etc., of the stimulus, as in sensation experiments. The mutual relations of the features of the stimulus-object have a distinct determinative effect. Let us move a step further. The experiments on the perception of meaning or apperception, those on the thought processes are familiar in the laboratories of to-day. The stimuli in these instances are no longer of the kind we have been discussing; they are *situations*. The simple physical object of sense-experiments, has been translated into a situation constituted of the inter-relation of a number of objects, and possessing a greater or less degree of unity. James, as we all know, was forced to concede in the course of his polemics in connection with the theory of emotion, that the stimulus for emotions is not an object but a *situation*. The mental tests and the tests in experimental education, likewise, present situations of varying degrees of complexity to the subject. And, the phenomenon of *Situation phobia* shows the contrast between the influence of the object and that of the situation involving the object.

The early scheme of psychophysics subsumed mental life under the rubrics of two determinants, the internal and the external psychophysics of Fechner. The subsequent efforts in this direction were concerned primarily with an abstract notion of the relations involved in the psychophysical situation. To reduce the number of determinants to the logically smallest number may not however lead us to a proper comprehension of mental-life. It is thus in the interest of scientific precision that the logical rigour in the classification of the determining factors should be relaxed. And enough has been said to show that the determinants of mental life have been enriched in their significance, and that their manner of operation is much better understood to-day than in the decade that has passed off. When we assert that the mental life is determined by heredity, social environment, physiological factors, or by the unconscious history of the individual, there is a concrete significance in the statement which could not be found some years back. Our comprehension of the mental life, is consequently richer and deeper to-day than ever before.

The progress that the science of Psychology has made of late in its method and technique, the rich harvest of materials that it has gathered through the patient researches of its numerous devotees, the light that it has thrown upon the whole sphere where living beings grow and act and react upon one another, have but faintly influenced the tenor of thought and of culture on the Indian shores. It is a phenomenon that appears strange and almost inexplicable. The aptitude for psychological analysis, the tendency to seek psychological causes of human events, to observe mental peculiarities and characters, and to endeavour for the development of mental capacities, seem ingrained in the Indian mind. The social and the religious practices

bear ample testimony to this. And, the materials for study, abound in almost every direction. The varieties of races and culture types call for investigations in Ethnopsychology and Differential Psychology. The western system of education grafted upon the Indian mind has to face ever new situations and forced to make ever new adjustments, demands studies in Experimental Pedagogy and investigation into the capacities of intelligence. The changing economic situation, which is forcing men to adopt new means of livelihood, urgently call for psychological selection in the interest of vocational guidance and for the prevention of the waste of human materials. The numerous groups and sub-groups of the Indian social order, the stratification of culture upon culture that history reveals, the eruptions of riot and social animosities, invite the social psychologist to a field unimaginably rich. The broken reeds of wear and tear of human life, the misfits that society fails to accommodate, and the tragic victims of psychoneurosis must and do abound in a vast population as ours; and there is an ample storehouse for the student of abnormal Psychology to draw his materials from and for the Psychiatrist to exert his humane efforts. Above all, India must share her burden of contribution to the unravelling of the mysteries of psychic life, to the development of Psychology as a science. The scientific Enlightenment which has so obviously dawned upon us, would be incomplete if the psychologist lags behind.

Nor is there a want of the potential agencies for the carrying out of the task. Psychology is taught as an academic subject in more than one hundred institutions in India. There are presumably more than one hundred persons teaching Psychology. There are thousands of persons who have pursued it as a topic of natural or forced interest; and every year adds to the number. Yet we seem to stand for ever in the same place. The productions are out of all proportion to the number of men

engaged in the study. This huge expenditure of the mental energy without any adequate return in the output of results is a serious reflection upon our economics of culture.

The filiation of Psychology to the philosophical studies in our educational institutions, and the natural tendency to emphasise in such cases, the metaphysic over the empirical issues, may in a large measure explain this fact of inanition. Where the potential of interest is philosophical, thought would normally flow towards the speculative reconstruction of reality. The motive of empirical observation would inevitably lose itself in the fascinating issues of epistemology; the picture of the mind as an empirical reality would transmute itself unperceived, into a philosophy of mind. And, the dominant philosophic view would cast its spell over the psychologic effort, often a devitalising spell. Any natural science would languish in such an atmosphere, as the history of sciences amply proves.

Moreover, philosophy abhors half-finished portraits. You cannot present your picture of the universe to the philosophic view until the lights and the shades, the colour and the form have enlivened it into an aesthetic unity. Mind too, then in our world of philosophy, must be portrayed in its completeness. But our empirical studies do not supply us with the rich variety of colours wherewith to conceal even the sketch of the skeleton. We fill up the gaps with the materials that speculation yields. It is this philosophic necessity, this supersession of the data by theories, that has led to the neglect of psychological work in our institutions.

I cannot pass on without noticing a widely diffuse and powerful factor that opposes a frank, scientific attitude towards things of mind. We meet every day with the view that the inner reality of mind surpasses all human comprehension, that the laws by which our mental life is interwoven can never be gauged by the empirical method. Not long ago a gentleman called at my laboratory and told me that the instruments and

the methods we employ are but toys and the rules of the game. They are but the playthings of the big babies in the laboratory. He advised me to see a certain sadhu who had solved the mystery of the mind and whose insight was a better ground for Psychology than all the data that we might gather. I have met scores of others of the same view who, inspite of their faith in intuition, are never slow to employ their rich experience, empirically gathered, in their dealings with men, and in their inferences concerning other peoples' mind. They are not averse to casual observation ; they object to its methodic, systematic character. There is an atmosphere of mysticism in which our philosophic and particularly semi-philosophic speculation thrives. And these half-articulate forebodings crystallize into an obstructive mysticism that stalks not only on the public streets but also within the academic walls. It creates a state of negativism, hostile to all sciences but specially to Psychology.

This formula of Pseudo-mysticism is a parrot cry that circulates from mouth to mouth and is employed only to damp the spirit of open-minded investigation. To this view our answer should be : we are concerned with facts and laws that can be demonstrated. If the experience that you speak of can be observed and studied by accredited methods, ours is the task to study it. If however you do not claim the power of intuition, cease speaking about the deeper reality of mind that eludes and falsifies the observed mass of facts. Yours is but a prattling about second hand facts gathered from books and hearsay. Even if there be flashes of sudden insight, it is no substitute for the patient analysis of truths gathered by numerous workers toiling for years. We have a robust faith in the agencies we use ; no amount of self-complacent mysticism, no mere vaunting of mystic knowledge would turn us away from our well-considered course. For, we, as psychologists, know only too well how illusory the flashes of intuitive illumination have been in the past.

I must draw your attention to another banal half-truth that passes current even among the highest classes of the Academic Intelligentsia. It gave me a shock to learn from a distinguished Professor of Philosophy at one of our Universities that there are two kinds of Psychology, a General Psychology and an Experimental Psychology. How would it sound, gentlemen, if you contrasted a General Physics from Experimental Physics, General Chemistry from Experimental Chemistry? The contrast is no less ridiculous in the case of Psychology. Our friends are deluded into their belief by a very simple fact. The data of observation are knitted together into theories and are presented in the books as a series of pictures of the different aspects of mind. You read your books; you apperceive the portraits in terms of your own experience; and you have learnt your Psychology. No effort save that of comprehensive reading is involved in such a situation; no question normally arises concerning the means of gathering the data. It is this passive method of study, which is all but universal in our seats of learning, that has given rise to the notion of this fictitious duality. You might study physics, chemistry or biology all in the same manner; you may not care to put yourself in immediate touch with facts. But would that entitle you to create a special class of general science to suit your private convenience? A half-truth, they say, has the longest life. But this one has lived more than its span. Should we not give it a decent burial, even if it has to be a forced burial?

There is another half-truth to which I must refer. Ever since it has been my lot to begin my work in the first laboratory of Psychology in India, I have been assailed times out of number, with the question whether Psychology is not merely Physiology diluted in speculation. This question, as you all perceive, arises principally from those interested in Physiology. They see that we employ some of their common appliances for our investigations; they watch us delving into

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physiological studies for the analysis of the data; and the rest, they do not care for. They conclude, in the light of their own science that the essential feature of Psychology is what it shares in common with Physiology. The rest is philosophic speculation. The debt that Psychology owes to Physiology in method and technic is a matter of history. But the arrangement of conditions of experiments and the manner of dealing with the data should amply demonstrate the difference between the application of the same instruments in the two different spheres. Physiological Psychology which constitutes a very important phase of psychological thought, has largely to draw upon the materials of Physiology in order to reach its laws and principles. But Physiological Psychology is not Physiology, nor is it the whole of Psychology. Of the multitudes of problems that faces the psychologist to-day there is only a small number that would derive any help in their solution from the barren and formal relation between the psychical and the physiological in the present stage of the latter science.

The task that devolves upon the psychologist in India to-day then, is not merely one of patient scholarly investigations but also of pioneering in our special field. It is our duty to dispel the delusions that circulate in the academic life; it is our duty to organise the energy wasted in the reiteration of text-book knowledge for the useful purpose of investigations. The entire idea of the teaching of Psychology needs to be transformed. Not a mere grasp of theories, although that too is essential; but the habit of careful observation and collection of data as well as the technique and the capacity of interpretation of results—these should be our main concern in the teaching of Psychology. In the fluid state in which our science is at the present moment, it would be more useful for one to be equipped with a swimming belt of independent observation than to have a resting place on the slight prominence of theories ever threatened to be flooded over.

The question naturally turns at this stage to that of laboratories. There seems to be an idea abroad that it means a huge outlay of expenditure to start a psychological laboratory. So it undoubtedly does, if you want a beautifully furnished laboratory, complete for all types of work, to be placed before you all at once. But that is not necessary. There are many branches of Psychology where observation is possible without the aid of instruments or with the help of inexpensive appliances. And even if you desire to build a laboratory, as you naturally would, you may begin almost with any amount from Rs. 1,000 upwards. Have few appliances that your interest and means dictate and let time supply the rest. In a poor country like ours, where a number of the educational institutes stand on the very edge of bankruptcy, or at best, of serious financial crisis, it would be too much to expect any new and expensive venture at the present moment. We all should be satisfied with the little that we can eke out of the already slender resources and be prepared to make the best of it. The expenses then need not deter us from our programme. Nor need the question of the value of specialization in the subject. I am fully aware that specialization in a subject can only be popular when the social and the economic agencies in the country are prepared to make use of the human output of laboratories. Until that consummation comes about, let the present arrangements stand; only give the teaching of the subject a new turn, a really empirical turn by associating it with laboratory work.

But, of far greater importance than technique and appliances, of much greater value than public appreciation and understanding, is the need of co-operation among those who believe in the future of our science, and are prepared to work for its advancement. The psychological wealth of India is yet unprospected and unsurveyed; the workers are few and far between. There are many problems such as the discovery of the norms for various mental capacities, the standardisation

tests, and the experimental study of educational processes that can only be solved with any degree of definiteness, if a number of investigators co-operate. There are other problems such as those of Group-Psychology, of Differential Psychology and Ethno-Psychology that imperatively call for a common scheme of work in the different parts of the country. Such co-operation will not only yield data of vast significance for the science of Psychology but will also at the same time, enable us to carry through a psychological survey of the nation. And we must not lose sight of the more immediate and practical end of firmly grounding our science in the academic system of India. It is only by enlightening the opinion of the academic public, not in one but in all the provinces, that this consummation can be reached. And, lastly, we all recognize the importance of the mutual give and take in thought, of frank criticism for the elimination of the dross from gold. We, as Psychologists should be the first to recognize the lesson of Group-Psychology, that the feeling of community adds to the vitality of thought and action. All scientific thought needs an atmosphere to breathe in its sustenance and to grow. Nowhere is the need greater to-day than in the case of Psychology ; and ours is the task to create the atmosphere.

Psychological Outlook and Philosophy

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The day is not very distant when Psychology will cease to be a subordinate branch of philosophical study and will claim an independent place in our academic life. The dissociation has already begun in some of the Universities of Europe and America, and if in India to-day the two subjects are still related, it is due more or less to the accident of paucity of qualified teachers. Signs are not wanting, however, to show that a clear line of demarcation is slowly but surely rearing its head, even in the philosophical East, and, from this standpoint, the establishment of the first Psychological Laboratory in 1916 at Calcutta in India, the home of spiritual culture, by the late Sir Asutosh Mookerjee, to whom Bengal owes almost everything that is daring and progressive in education, is an historical event of first-rate importance. The old-world teachers may deplore that the advance of psychological study on scientific lines is likely to spread materialistic tendencies (as if the advance of the natural sciences left anything more to be done in that line), but the fact must be faced that Psychology with its ramifying branches has grown too big for perpetual tutelage under Philosophy, and that it is a bit of anachronism to expect the teacher of Psychology to be at the same time the custodian of the soul's salvation.

It must be remembered that the challenge to the spiritualistic outlook is not a recent development, and, that even if Experimental Psychology shows that the mind is as much

subject to laws as matter this would not be the first denial of the freedom of the will. Long before Psychology attempted to establish the mechanical character of mental reactions, the Philosophers had been discussing the problem, and even the great Kant did not hesitate to apply the category of causality to all phenomena, mental as well as material. The war against Necessitarianism in the pages of Ethics and Theology long antedated the rise of the New Psychology, and, as for Materialism, Psychology had very little to add to what the French materialists of the 18th century urged in its favour. In fact, the postulate of parallelism, so generally accepted in almost all the schools of Psychology, steers clear of the heat and bias of the ethico-theological controversies concerning freedom and determinism.

Psychology has been able to show how much men agree fundamentally in outfit and reaction, and, it has done an immense good by attempting to break down individual and racial arrogance and to show how little normal people differ among themselves. So long as we remain under the impression that the metaphysical need is the only one that counts, and that, without that end in view, we may gain the whole world but lose our soul, there will be no honest study of man as a psychological entity or rather as a psycho-physical entity. We appreciate here the wisdom of the Indian philosophers who made a clear distinction between Mind which they regarded as a material entity and Soul which they regarded as spiritual. The study of mind might proceed without any hindrance from considerations of the soul, although ultimately the requirements of the soul might demand the entire suppression of mental processes. Mind and not its study, was the real obstacle in the path of salvation : in fact, it was obligatory on the part of the spiritualist to study mind so that he might devise some means of stopping its operations altogether. The moral discipline supervened upon a naturalistic study which was not only not unfettered but actually encouraged, as a

study of the different philosophical systems, especially of the Yoga and Buddhistic systems, shows.

It would indeed be a strange spectacle if Metaphysics were to disown its debts to Psychology. The war between Empiricism and Rationalism was really a war between the rival claims of sensation and reason, and when Criticism joined the fray, it only tried to deal evenhanded justice to both. The way in which we know is bound to determine in the long run the nature of the object we know. Realism of some kind ought to be the metaphysical creed of those who are for denying the contribution of Psychology to Metaphysics; but curiously enough it is Idealism and not Realism that is the creed of theologians. If reality is deeply coloured in its delineations by the contributions of mind, is it not obligatory on us to study what we really are mentally, even though that may not always lead us to the position we desire to reach? What if Psychology reveals that we are not so intellectual or so rational as the older idealists and the theologians thought? What if the passionate nature enters deep into the fabric of all our constructs as F.C.S. Schiller so ably urges? Is it not a gain to know that the difference of ethical and religious beliefs, as also of metaphysical theories, is due to the fact that man's thinking is after all a personal affair, owing its origin to accidents of birth and training, and not wholly a disinterested phenomenon? Is it not a distinct gain to Metaphysics to know how much of our so-called knowledge is really of the nature of postulates and assumptions? An honest metaphysics must face all these psychological questions, in order to be secure in its foundations.

Never was the time more propitious for a just recognition of the contributions of Psychology to Metaphysics than the present moment. Almost every system of philosophy seeks to-day to build upon the basic fact of psychological experience. The trend of thought from Avenarius and Mach to the

philosopher of Radical Empiricism is essentially psychological. The thinkers in question have not only given a new turn to Metaphysics but also to Psychology. The same thing holds true of Humanism and Instrumentalism. Dewy and Schiller have carried their appeal in the matter of logic from the court of metaphysic abstraction to that of concrete psychological experience. The Realist of to-day, as typified by Messrs. Russel, Alexander and Perry, is no less concerned with Psychology. It was the opposing logical principles that Metaphysics had to meet and manipulate in the past; it is the psychological fact that the Realistic metaphysician has to contend with now. Thus, we find him concerned with the illusions and affective experiences as facts in the Realistic universe. Bergson and his predilection for Psychology need but little mention. For, it is obvious even to casual observation that Bergson places an implicit reliance upon facts that introspective analysis yields. The truth is, most of the criticism levelled against Bergson, is not against Psychological method as such, but against the sort of Psychology that he professes.

It is again untrue to say that Psychology is inimical to a philosophical outlook on life. Neither in ancient nor in modern times have psychologists failed to contribute their quota to philosophical generalisation. The whole British Empirical school was really a philosophical school basing itself on Psychology. Locke's theory of the development of knowledge is at once psychological and metaphysical (in the limited sense of the empiricists). Psychology still retains Hume's distinction between Ideas and Impressions and most of his disquisitions about the laws of association. Even the idealist Berkeley based his theory on a new theory of vision. Spencer's doctrine of Transfigured Realism comes at the end of his 'Principles of Psychology' and James declares himself in favour of Radical Empiricism. The psychological beginning has in none of these cases stood in

the way of a metaphysical end. But the metaphysics is here a hardearned metaphysics, based on a solid mass of concrete experience and, therefore, nearer reality than much of the older stuff. Wundt, Münsterberg, McDougall and Ward are at once psychologists and metaphysicians and Freud also is beginning to be both. Mach, Avenarius, Meinong and many other Continental psychologists have also not failed to draw metaphysical conclusions from their psychological standpoints. If we do not have many more, it is because the majority of psychologists do not now have opportunities of metaphysical training, their own subject being now more exacting in its demands than before, on account of its far-flung dominions.

It is absurd to suggest that the growth of psychology will be the death of the philosophy of mind, and that we shall soon become either materialists or mere cataloguers of mental facts. A large number will necessarily accumulate masses of facts and do nothing more, but a few will continue to use those materials in the interests of philosophy, just as a few natural scientists are doing. The metaphysical genius is a rare commodity, but the collection of facts may go on in the meantime, and in fact, in all times for him, to appear and to utilise them in the interest of speculation. The attitude of suspicion and distrust which many philosophers in India bear towards Psychology to-day comes out of a sense of lost dominion. It is wise to recognise in the domain of thought, as in the domain of politics, that a growing body of independent thinkers cannot be kept perpetually under tutelage. Psychology is now a vast discipline which touches man and other animals at a increasing number of points. Man again has to be regarded not only as an ultimate problem for the metaphysicians but also as an empirical problem for the sociologists, psychologists, anthropologists, jurists, economists and others; as such, he is a problem for all the sciences that bear on his nature. The metaphysicians must

hold their soul in patience, for though in point of importance he comes first, in point of time he comes at the very end ; for, otherwise his generalisation would be partial and defective for want of sufficient data. Even if the psychologists do not draw the metaphysical implications of their own doctrine, their work will not be in vain, for they will have left a record of man's abilities and equipment which cannot fail to be useful to the philosophers. If, however, the metaphysical conclusions do not happen to coincide with those desired by the theologians, it would not be the fault of the psychologists, for they are pledged to truth and impartiality and must let the facts speak for themselves. Was there ever a time when philosophy had a single theory of man and the universe ? Why, then, should the psychologists be afraid to record the fact, as they find them ?

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Brain Capacity and Intelligence

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Students of Anthropology have been long interested in the relation of brain capacity to intelligence. The weight of the brain differs among individuals and there seems to be a marked divergence in this respect among races. By a careful enquiry Broca has shown, that compared to a group of eminent men, the brain-weight of a group of ordinary individuals is smaller by 80 grammes on the average. Figures available on different races also indicate that the tribes appearing at the bottom of Progress suffer in comparison with those at the top. Thus the average brain capacity of the Australian aborigines falls below 1300 c.c. as against 1450 c.c. of the modern Europeans. On the other hand, persons of exceptional ability like Gambetta had small brains, and men having capacious heads are not always known to be intelligent. Taking everything into consideration, therefore, the relation between brain capacity and intelligence is not clear and investigations so far have failed to discover any exact correlation. An enquiry was undertaken in 1921 in the laboratory of Physical Anthropology, Harvard University, under the directions of Professor E. A. Hooton, Curator of Somatology, to find out the relation between brain capacity and intelligence. For this purpose fifty (50) American students of the University were measured and brain capacity calculated from the three head measurements, namely, the maximum Antero-Posterior

length, the maximum Transverse diameter and the Auricular height according to Lee-Pearson formula¹ which has been found on careful investigation to give results with an error of less than 2 p.c. They were then subjected to the Army Alpha Intelligence Test. An average was also taken of the marks of each student in the periodical examinations of the entire academic year. The results thus obtained are given in the following correlation table.

The averages and the co-efficients of correlation calculated according to Pearson's product moment formula are given below with their probable errors :

Average Brain Capacity	...	1520 c.c.	±	·13
Average Score on Army Alpha Test	...	170·5	±	·019
Average Score on Examination	...	144	±	·0101
" r " between Brain Capacity and Army Alpha Test Scores.		·11	±	0·99
" r " between Brain Capacity and Examination Scores.		·17	±	0·108
" r " between Army Alpha and Examination Scores.		·12	±	0·08

It will be seen from these figures that correlation is absent between brain capacity and intelligence as measured by both the Army Alpha and Examinations tests. While our results are in agreement with those of the investigations hitherto carried,² it will not be fair to draw decisive conclusions from the above. For, on the one hand, the number examined was too small, and on the other, we are not sure how far the Army Alpha and University Examinations are real measurers of intelligence. All that can be said to have been proved up till now is that these tests show appre-

¹ A first study of the correlation of Human Skull by Alice-Lee and Karl Pearson Phil. Trans. Roy. Soc., London, 1901, Series A, Vol. 196, pp. 225-64.

² On the correlation of Mental and Physical characters by Lee, Lewenz and Pearson, Part I. Roy. Soc. Proc. 1902, pp. 333-42 Part 2—1903, pp. 106-114; On the Relationship of Intelligence to Size and Shape of Head by Karl Pearson. Biometrika, 1906, Vol. 5.

able correlation with some special abilities but there is no evidence that they bring into operation the entire workings of the intellect. A recent attempt³ to correlate Army Alpha Tests Scores with actual business success of 73 American business men has not given any satisfactory result and our own enquiry has failed to show any appreciable correlation between the Army Alpha and Examination Scores.

Under the circumstances all that can be legitimately stated is that no definite correlation has been found between brain capacity and intelligence but whether this is due to real absence of correlation between the two or the inability of the tests to measure intelligence cannot be ascertained with certainty.

My thanks are due to Dr. Chi Li, now in Nankai College, Tientsin, China, and Mr. Gerald P. Lestrade now in the University of Cape Town, South Africa, for helping me in these investigations.

³ Intelligence Test Scores and Business success by W. V. Bingham and W. T. Davis. *The Journal of Applied Psychology*, 1924, pp. 1-23.

A note on the Correlation between the Psycho-galvanic Reflex and 'Learning-effort'¹

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The Learning Task studied here in relation to the Psycho-galvanic Reflex phenomena is Mirror Drawing. The procedure in giving the test is in all respects the same as usually followed in investigations on the 'Whole and Part methods of Learning,' except for certain variations detailed below. The pattern given here for Learning was not the Star Pattern but a zig-zag pattern containing 24 lines, the distances between any two consecutive points being just the same as in the Star Pattern.

While the subject was attempting to trace the pattern with the stylus in his right hand, his left hand was put in circuit with the Psycho-galvanic apparatus.

A measure of Learning-effort is obtained through counting up from the tracing the number of attempts made by the subject on each of these 24 lines. The Psycho-galvanic reflex is calculated in terms of Millimetre deflections of the light from the mirror in the galvanometer. The readings of galvanic reflex are obtained in the following way. The experimenter watches the progress of the stylus from point to point and presses an electric key so as to ring a bell every time the subject gets to the spot successfully. An assistant, who is closely following the play of the spot of light on the scale, notes down the maximum rise or fall for each period of progress from one spot to the next. Before starting the

¹ Read at the Indian Science Congress, Psychological Section— Abstract prepared by the Board of Editors.

² For a full description of the apparatus, details of electrical connections, of obtaining records, etc., see Whately Smith "Measurement of Emotion," p. 32.

subject on the Learning experiment, the initial Resistance in ohms of the subjects is noted down. A record is also kept of the deflections of light along the scale for two successive decreases of 1000 ohms each in the Resistance box, with a view to converting, if necessary, the millimetre deflections into changes in ohms resistance.¹

Thus we obtain for each of these 24 spots two sets of records, one being the number of attempts made by the subject in doing each line successfully, and the other the amount of galvanic deflection in millimetres shown while attempting each line. The data given here represent only four experiments with one subject. While fully realising, therefore, that the data reported here are too meagre to warrant any generalisation, we might notice some of the suggestions they seem to yield. There appears on a casual inspection, a tendency for the correlation between the number of attempts and the amount of galvanic deflections to increase, with every advance in the stage of 'Habituation.' Now this increasing tendency to agreement can be roughly measured in terms of the number of more or less parallel lines in the graphic record for each practice. The same tendency is perhaps more easily measured in terms of the number of concurrent peaks and dips in the graphic record.

*The Number of Concurrent peaks.
and dips in the Graphic Records
of Learning attempts and of the Galvanic deflections :—*

I. Practice	...	...	9.
II. Practice	...	...	14.
III. Practice	...	...	18.
IV. Practice	...	...	14.

¹ Another method of converting, we have often found useful, is to so increase or decrease the sensitivity of the galvanometer as to render a 10 centimeter reflection along the Scale equivalent to a change of 1000 ohms resistance on the part of the subject. This device makes it easy to compare directly the Galvanic reflex record obtained from different subjects and from the same subject at different times.

Now this increasing tendency to agreement as we go from the earlier to the later practices (up to a certain point), would appear to be contrary to expectation. One would think that with increased 'Facilitation' the subject would get more and more adapted to the Learning situation and would therefore be less and less liable to "emotional excitement." The data reported here would contradict such theoretical expectations only if it is tacitly assumed that the galvanic reflex is simply an indicator of the intensity of emotional reaction and no more.

If on the other hand we suppose that the galvanic reflex is an indicator of Intellectual processes, it would seem possible to understand the tendency in the data presented above, for the Learning attempts and the galvanic deflections to correlate more and more closely with every advance in the stage of 'Habituation'. It is suggested, therefore, that the 'Intellectual' or the 'Rational' processes which usually appear in the later stages of Habituation probably cause the galvanic reflex phenomena. Now such a result would go to corroborate the findings of M. D. Waller,¹ who as a result of her investigations on 73 medical students concludes that intellectual efficiency as judged by examination results is associated with 'higher nervous sensitiveness' in the Psycho-galvanic reflex.

The claim advanced by A. D. Waller,² that the galvanic reflex is a better indicator of the attempt of the subject to suppress the emotion aroused, *i. e.*, of the amount of inhibitive control over affective experiences, than of the intensity of the affective experience itself, would also seem to favour the view that the Rational or the Intellectual processes are probably correlated with the galvanic reflex.

¹ 'The Emotive responses of 73 Medical Students' in 'The Lancet,' 1918, p. 510.

² The periodic variation in the conductance of the palm of the human hand, *Proco. Roy. Soc.*, 1919, B. Vol. 91, p. 32.

In view of the scanty recognition ¹ in current literature of the galvanic reflex as an indicator of "Intellectual processes, our results, so far as they go, would seem to be of special interest, and it is hoped that further experiment on these lines would yield us more conclusive results.

¹ For instance Prideaux concludes " Even if a pure intellectual process does produce a reaction it is very small, and is in no way comparable with the deflections produced by an affective process, so that for all practical purposes it may be considered that among mental activities, only affective processes have any influence in exciting the reflex. This is also confirmed by the fact that after repetition of the stimulus the reflex becomes correspondingly diminished"—See 'Brain,' 1920, p. 50.

Influence of the Reproducing Process in Memorisation¹

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The method of reproduction is as old as the experiments on memory. In this method, as is well known, "a series of nonsense syllables is read through, at a prescribed uniform speed and the readings are repeated until the first correct reproduction can be effected. The results express the number of repetitions just necessary to effect perfect reproduction. Throughout the experiment every reading is followed by an attempted reproduction until a successful result is attained."

It is assumed in the experiment that repetitive or the presentative process alone, is effective for the complete reproduction. The reproducing efforts are not calculated as factors conducing to memorisation. The purpose of the present paper is to show by an analysis of a number of experimental data that the *effort of reproduction itself is a determinant of memory*, in the same sense as the presentative factor.

Procedure.—The procedure adopted in the experiments was to present 15 nonsense syllables for memorisation. In the first series reproduction was called for after following each repetition until complete memorisation. In each subsequent series the number of attempted reproduction was gradually diminished, for instance, in the second series there was a reproduction after every two repetitions, in the third series there was a reproduction after every third repetition and so on.

The subjects of the experiments were 4th-year Honours students for the degree of B.Sc. in Experimental Psychology. They were consequently perfectly familiar with the laboratory technique. There were five subjects. The experiments were completed in the course of the College Session, 1924-25.

¹ Read at the Indian Science Congress, Psychological Section (Abstract).

The materials of the experiments were prepared with usual care. The presentations were auditory in character. In view of the fact that the subjects were all trained in this type of work, no particular difficulty was experienced.

TABLE I.

	Number of presentation	Number of attempted representation	Number of Syllables reproduced
Subject I.	12	11	15
	14	7	13
	16	4	14
	15	3	14
	24	1	13
„ II.	12	12	15
	22	11	13
	24	8	13
	24	6	10
	30	5	11
	36	1	11
„ III.	12	12	15
	16	8	13
	15	5	13
	12	3	12
	12	1	11

	Number of presentation	Number of attempted representation	Number of Syllables reproduced
Subject IV.	14	14	15
	16	8	14
	20	5	14
	20	1	13
„ V.	7	7	15
	8	4	12
	9	3	11
	14	1	9

The results of experiments on the five subjects are given here in a tabular form.

Treatment of Results.—The Table shows how the number of repetitions increases in most cases with the reduction in the number of reproductions. The data suggest that the process of reproduction is a determinant of memory. We may arrive at a more exact understanding of the rôle of the reproducing factor, if we can estimate its value as a ratio of that of the presentative factor. With this end in view, the data were represented in the forms of linear equations containing the two unknown quantities (P and R — the Presentative factor and the Reproducing factor); for instance the subject No. I required in the first series 12 presentations and 12 attempted reproductions for complete memorisation; this was represented in the equation as $12P + 12R = 15$ where 15 is the total number of syllables. But as the number of reproductions diminishes certain considerations arise in the actual formation of the equation.

For, the exact stage at which memory completes itself cannot be actually localised. Thus when there was one reproduction after two presentations the subject No. I required 16 presentations for complete memorisation but as we could not know at which stage between the 14th and the 16th presentation the memory was complete, the result of the 14th presentation was represented in the formation of the equation and other equations were similarly formed. Thus more than two equations were obtained involving only two unknown quantities P, R. So the values of P and R were solved by the "Method of Least Squares." In the Table II the equations are given with the respective values of P and R.

TABLE II.

Subject I	... $12P + 12R = 15$	
	... $14P + 7R = 13$	
	... $15P + 5R = 14$	$P = .709$
	... $16P + 4R = 14$	$R = .604$ or, $P : R = 116 : 100$
	... $18P + 3R = 14$	
	... $24P + 1R = 13$	
Subject II	... $12P + 12R = 15$	
	... $22P + 11R = 13$	
	... $24P + 8R = 13$	$P = .23$
	... $24P + 6R = 10$	$R = .98$ or, $P : R = 24 : 100$
	... $30P + 5R = 11$	
	... $36P + 1R = 11$	
Subject III	... $12P + 12R = 15$	
	... $16P + 8R = 13$	
	... $15P + 5R = 13$	$P = .68$
	... $12P + 3R = 12$	$R = .69$ or, $P : R = 100 : 100$
	... $12P + 1R = 11$	
Subject IV	... $14P + 14R = 15$	
	... $16P + 8R = 14$	
	... $20P + 5R = 14$	$P = .62$
	... $20P + 1R = 13$	$R = .50$ or, $P : R = 124 : 100$
Subject V	... $7P + 7R = 15$	
	... $8P + 4R = 12$	
	... $9P + 3R = 11$	$P = .59$
	... $14P + 1R = 9$	$R = 2.1$ or, $P : R = 28 : 100$

Analysis of the Table II explicitly shows that there is no constancy in the ratio between the values of the two factors P and R. P and R influence the memory in different ways; the values of P and R are in most cases different. They may thus be called independent variables in memory function.

The second characteristic brought out is *individual difference*. This difference is not accidental as is shown by the constancy in the rate of increase and decrease maintained by each individual in the different stages of reproduction. This difference must then be considered as pertaining to individual's psychological constitutions and this difference is most significant.

P and R thus produce very different effects upon different individuals. For some, the P-process is of greater value than the R-process and for others the case is just the reverse.

A consideration of this fact leads us to the conclusion that in the actual memory work each individual is limited to the P or R factor as his nature may be. We may thus have a new classification of the memory type. Some, we may say, belong to the *Repetitive Type* and others to the *Reproducing Type*. The method of calculation that we have here followed would easily determine the filiation of an individual to a type. Those who are of the *Reproducing Type*, i.e., those in whom R has greater value, require larger number of repetitions for complete memorisation when the number of attempted reproductions is considerably decreased, as in the case of the subjects II and V, than that required by the *Repetitive Type* as for instance by the subject IV. The calculation of the values of P and R opens the way for a useful practical application. The individual belonging to each type may learn most economically only by emphasising either the P or R factor as the case may be.

The Table III shows that the calculated values correspond to the actual results. It has been well said that in the application of mathematical methods to psychological

phenomena, we should always check our calculations in terms of the actual psychological data. For in the sphere of psychology, mathematical calculations are based more or less upon analogy. We must make sure that we are not carried away from the facts on the wings of the analogy.

We pause for the last significant consideration relative to our method. In the formation of the equations the P and R factors were added to each other in producing the total memory. This additive relation of P and R is a matter of speculation only. We know no theory of memory which satisfactorily explains the relation between them. There is nothing to be said in favour of this assumption and at the same time there is nothing against it. The only way of showing whether the assumption is justified or not is to collate the values of calculation with the actual data in as many cases as possible. It has not been possible for me to do it to any large extent at this stage of my work. I hope to report on the matter afterwards. But I want to throw out a suggestion that if such collation holds as it does in these few cases, it would be proved that P and R are really additive.

TABLE III

SUBJECTS	Calculated values of P & R	ACTUAL DATA	
		Number of repetitions for complete reproduction when each rept. was followed by an attempted reproduction	Number of repetitions when one attempted reproduction was allowed
I	116 : 100	12	24 for repro. of 13 Sy
III	100 : 100	12	12 „ „ „ 11 „
IV	124 : 100	14	20 „ „ „ 13 „
II	24 : 100	12	36 „ „ „ 11 „
V	28 : 100	7	14 „ „ „ 9 „

An Enquiry into the Comparative Psychology of Indian and Western Childhood¹

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Some years ago the writer's attention was drawn to a series of investigations regarding the mental characteristics of American and English children, carried out under the direction of Professor Earl Barnes, and published in two volumes entitled 'Studies in Education'.

These investigations were conducted on the 'questionnaire method,' i.e., a series of questions were set simultaneously to the children in a large number of schools, and the resulting answer-papers were analysed and tabulated in accordance with the age and sex of the writers and the mental characteristics shown in their replies. The result was, in the first place, a valuable series of reliable statistics dealing with children's ethical and intellectual development; in the second place, a mass of data was obtained relating to the methods which must be adopted in order rightly to encourage the development of mind and character. In the third place, an interesting comparison was rendered possible between the American and the English child and hence material was obtained for a comparative study both of existing and of desirable pedagogical methods in the two countries.

It occurred to the writer of the present paper that it might be of interest and advantage to extend the ground of the enquiry instituted by Professor Barnes, and by applying

¹ Read at the Indian Science Congress, Section of Psychology. (Abstract.)

the same method of eliciting information under, as far as possible, identical conditions, to obtain the material for a comparative study of Western and Indian child-psychology. Such an investigation might throw interesting light on variations in the psychological make-up of the races in question, and might form a means of pointing out desirable changes in the pedagogical methods obtaining in India.

Accordingly the questions set in the Barnes Survey were printed, and distributed to a large number of schools in India, with the request that they should be set in the form of a General knowledge examination paper. The resulting answer-papers were analysed (by the writer of this paper) by the same method as that adopted in the Barnes Survey.

Conclusions.

The following were the general conclusions reached from a study of the masses of material represented by these 1164 answer-papers:—

1. The Indian child is markedly more susceptible than the Western child to religious and ethical influences and ideals, and less susceptible to materialistic considerations.
2. The ethical ideals of Indian children lack definiteness, and their conceptions generally are more abstract and subjective than in the West. Their ambitions also are much vague.
3. Indian children have much less idea of the meaning of public-spirit: and less fondness for truth for its own sake, though their motives for lying are more altruistic than in the West.
4. The Indian child is less interested in animals than the Western child, and the affection he gives to pets is more utilitarian in nature and motive.
5. The beauty of nature, and the esthetic factors of colour and form, appeal less to the Indian child; but archi-

tectural beauty appeals to him far more than to the Western child.

6. The Indian child has a less developed critical faculty than the Western, much less knowledge about common objects, and less ability to express what he knows. Elementary thought-processes appear to persist longer and in a stronger degree than in the West, whilst the more advanced processes develop later and remain weaker. This is no doubt due to defective educational methods, and may, in time, be remedied, as is indicated by the fact brought out in the survey that although history is worse taught in India than in the West, it is found more interesting in India than in the West, and has more influence on mind and character.

7. Home-discipline has a much stronger influence in the West, especially over girls. Conversely school-discipline has a much stronger influence in India, especially over boys.

8. Indian children are much more docile or ready to accept discipline without question than Western children.

9. Indian children are much more improvident with money than Western children.

10. Altruistic considerations make far more appeal in India than in the West, as also does the desire to obtain a good education.

Studies in Muscular Work by the Ergographic Method¹

H. P. MAITY AND C. P. N. SINHA.

A simple muscular work as the contraction of the middle finger against a load in the Ergographic experiment is done very differently by different individuals. The purpose of the present investigation is to study and analyse the nature of these individual differences by comparing ergograms of different subjects. The comparison shows peculiarities in work curve which remain more or less constant for the same individual. These are no doubt of great psychological interest and probably involve not only physiological but also such general psychological factors as Temperament and Mental Attitude.

The experiments were carried on in the Laboratory of Experimental Psychology, Calcutta, for more than a month. 119 records were taken in all. We had 10 subjects who readily submitted to the conditions of the experiments. They tried to keep regular habits during the period of our experiments.

An Ergograph of the Mosso type was used and the usual ergographic method adopted. The total amount of work done by the contraction of the middle finger till the point of 'fatigue' was reached has been calculated as usual. We know that some individuals fatigue quickly and some slowly. There are, also, different kinds of fatigability. For comparing the different subjects in regard to their rate of increase of fatigue, we have adopted a new mode of calculation. The contractions have been grouped as successive series of 10 pulls each. The amount of work done by the first series of pulls gives the subject's normal efficiency in his work, when he is fresh and is in the best phase of his

¹ Read at the Indian Science Congress, Psychological Section—1925. (Abstract.)

working capacity. The work done by the succeeding series shows in most cases progressive decrease. This decrease can be represented as loss in efficiency by expressing it as a ratio of the amount of normal efficiency. Only in two cases the second series of pulls gave the highest amount of work and in these two cases the output of the second series, instead of that of the first, was taken as the amount of normal efficiency. The ratio obtained has been called Fatigue Coefficient. It has been calculated according to the following formula:

$$F. C. = \frac{x-y}{x}$$

where x stands for the work done by the first group of 10 pulls and y for the work done by any of the succeeding groups of 10 pulls.

I.

In the first series of our experiments we have discussed Individual variations. Table 1 shows the average amounts of work done by the different subjects when working with a load of 4 kg.

TABLE 1

Subject.	Average.	Maximum.	Minimum.	No. of Pulls.
1 ...	9.497	12.45126	7.860	110
2 ...	5.34	6.108	4.476	76
3 ...	10.11	12.276	7.567	125
4 ...	5.35	6.13	4.605	58
5 ...	3.8318	4.67	3.1725	27
6 ...	6.6985	7.31	6.145	49
7 ..	13.642	18.236	9.048	180
8 ...	7.447	8.656	6.28	100
9 ...	5.662	6.128	4.198	110
10 ...	8.687			

The different subjects show a very wide range of variation in regard to average output of work. The maximum and the minimum amounts of work of the different subjects also show a similarly wide variation.

Individuals differ very much in their rate of increase of fatigue. This is apparent from Table 2 where the average Fatigue Co-efficients for the different subjects are given.

TABLE 2

Fatigue co-efficients increasing in successive periods of 20 seconds each.

Subjects	1	2	3	4	5	6	7	8	9
2nd Period ...	·03	·08	·08	13	19	·05	·02	12	·05
3rd „ ...	·09	12	10	30	64	16	·04	24	·08
4th „ ...	15	15	22	36		34	·08	34	12
5th „ ...	20	27	32	65		54	11	40	23
6th „ ...	28	41	44	86			16	46	18
7th „ ...	37	59	55				13	55	36
8th „ ...	49	75	59				23	59	46
9th „ ...	64		69				32	66	66
10th „ ...	73		71				40	69	76
11th „ ...	76		76				43	75	76
12th „ ...	82		78				50	85	80
13th „ ...	85		88				55	91	
14th „ ...							58	93	
15th „ ...							56		
16th „ ...							50		

The question of Types in regard to Working capacity as recorded in the ergogram suggests itself. We know that the same individual gives different curves on different days,

though working every day under nearly identical conditions. But these variations are clearly less wide and more significant than variations of all the subjects from one another in respect of total output as well as Fatigue Co-efficients. We can posit relative constancy of type from the following considerations :

The three curves of average, maximum and minimum works of each subject indicate the existence of a positive correlation with one another. This suggests that the range of variation of outputs of different subjects is to a great extent characteristically different. Also the total average output of all the subjects taken together is only 3.3 times its Mean variation, whereas the averages of the outputs of the different subjects are from 5.5 times to even 17 times their respective Mean variations. This indicates that range of normal variation in an individual's work is very small as compared with that of all the subjects taken together. It may be incidentally mentioned that those who have worked higher averages show greater variability. Further, the rate of increase of fatigue of different subjects as indicated by the increase of their Fatigue Co-efficients in the successive periods of work is characteristically different for the respective subjects. In other words, even on different days the same individual tends to show the same or nearly same Fatigue Co-efficients at each of the succeeding periods of work.

A careful examination of the profiles of the ergograms also bears out the contention about the relative constancy of an individual's type of work and his individual peculiarities in the different phases of the work curve. Our results confirm the observation of Mosso that the "individual type of work" is constant. We suggest that these individual peculiarities cannot be fully explained in terms of Physiological factors alone. They very likely point to important differences of Psychic temperament, mental attitudes, etc.

II.

In a second series of experiments we tried to study the effect of different conditions on muscular work and fatigue. We note here only the conclusions reached. They should however be confirmed by more prolonged studies.

(1) We cannot say from our ergographic studies that all persons have the best time of work at any definite hour of the day. Our results indicate that different persons have different periods of the day as their respective times of efficiency. Two out of the six subjects who sat for this series of experiments had it in the morning, two others in the afternoon and the remaining two in the night.

(2) Heavier weight seems to be more exacting and causes, in the long run, less total output but greater fatiguability.

(3) Rapid rate of work tends to decrease total output and to increase fatiguability.

PROCEEDINGS

OF

The Inaugural meeting of the "Indian Psychological Association" held at the Benares Hindu University, on the 14th January, 1925, at 1 p. m.

At the meeting of the Psychological Section of the Indian Science Congress on the 14th January, Professor G. C. Chatterjee of Lahore suggested that an Association, having as its aim the advancement of the Science of Psychology in India, be formed. Dr. Gopalaswami, Dr. G. Bose, and Mr. H. Bhattacharya supported the proposal.

Dr. N. N. Sengupta acted as the President.

The President in putting the matter before the meeting said :—

"Our recent experience in connection with the Psychological section of the Indian Science Congress, has amply proved the fact that psychological investigations by workers in different parts of India are daily gaining in volume. As many as 28 papers have been contributed to the psychological section of the Congress. Some of these papers are of outstanding merit. It is certain that many more papers would have been produced with better organization and co-ordination. With a view to this, it is desirable that psychological societies should be formed in different parts of India wherever there are opportunities for psychological work. These societies are expected to carry on work according to their own predilection. Such work may be made more fruitful if all these societies have a common meeting-ground in the shape of a central organization. In view of the gradually increasing importance of psychological works of different fields of knowledge it is expected that a central organization with an efficient executive would be in a position to promote interchange of ideas and facilitate research work in different fields. It is therefore proposed to have a Central Psychological Association with societies in different parts of India affiliated to it. This central organization would be managed by an executive body to be elected for a fixed period.

The central organization may arrange for the publication of a journal if sufficient funds and materials are forthcoming."

The members approved of the idea.

The President suggested that it would be advisable to appoint a committee for drawing up a constitution and dealing with such other matters as might arise in connection with the formation of the Association.

Professor G. C. Chatterjee moved and Professor Rice and Dr. Gopalswami supported the following resolution :—

That the following members do constitute a committee to draw up a constitution of the said Association and to make such other suggestions as they might think necessary.—

1. Dr. N. N. Sengupta (Chairman).
2. Dr. G. Bose.
3. Dr. Gopalswami.
4. Prof. G. C. Chatterjee.
3. Mr. Malkani.
6. Mr. H. Bhattacharya.

The following draft constitution was presented before the meeting on the 15th January by the committee :—

COMMITTEE'S REPORT.

The following draft scheme defining the constitution is placed before you for consideration and acceptance.

Statutes of the Indian Psychological Association.

(1) TITLE.

The association as constituting a central organisation of the different societies already in existence or hereafter to be formed shall be called the Indian Psychological Association.

(2) LOCATION.

The location of the Association is the place of residence of the President for the time being.

(3) AIM.

The aim of the Association is

- (i) co-ordination of psychological research ;
- (ii) publication of psychological works in English and the vernacular languages and translation of existing foreign works ;
- (iii) publication of a journal when funds permit ;
- (iv) organization of lectures and scientific discussions ;
- (v) standardization of the psychological curricula of the different Indian Universities ;
- (vi) and such other items as may be determined from time to time.

(4) MEMBERSHIP.

The Association consists of

(a) the ordinary members of the branch societies, whose election is decided by the conditions valid for the individual society to which they belong. Where there is no local society, membership of the Association can be achieved only through election to the nearest branch society. A member belonging to an already existing branch society should transfer his allegiance to a new affiliated society whenever such an organization is formed at a place nearer to his place of residence ;

(b) members elected directly by the Association upon the nomination of *five* members and with the approval of the President.

Membership shall cease on

(i) voluntary resignation which must be notified in writing to the President of the Association through the President of the branch society or directly, in the case of members elected under 4 (b) ;

(ii) in case of gross injury to the interest of the society, on the proposal of the Central Executive by the resolution of three quarters majority of the members present at the Congress. In the interim the membership may be suspended by the Central Executive with the approval of the President of the local society to which he belongs. The initiative may be taken either by the President of the local society or by the President of the Association ;

(iii) non-payment of subscription for two years.

(5) MANAGEMENT

The management of the Association shall be in the hands of a Central Executive consisting of the President, Vice-Presidents, two Honorary Secretaries and two ordinary members. One of the Honorary Secretaries shall act as the Treasurer. The first Council shall be nominated by the Congress meeting after the rules have been approved. The Central Executive shall take all steps necessary for the advancement of the aims of the Association in accordance with the statutes.

(6) PRESIDENT

The President shall hold office for two years and shall be elected at the annual Congress of the Association. The President shall nominate one of the Honorary Secretaries. The two ordinary members and the other Secretary shall be elected at the annual Congress. The Secretaries shall also hold office for two years. The President may consult in special circumstances the Presidents of the branch societies.

All Presidents of the branch societies shall be Vice-Presidents of the Association.

All elections shall be by ballot.

(7) BRANCH SOCIETIES

Branch societies shall be guided by their own rules, provided such rules are not in any way contrary to the statutes of the Association. Admission of any branch society to the Association shall be decided by the Congress, but in the interim the Central Executive may admit it until the next Congress meets. The rules of all branch societies must be approved by the Central Executive and all changes in the rules of the branch societies shall have to be approved by the Congress, or in the interim by the Central Executive. No branch society shall be disaffiliated except upon the recommendation of the Central Executive by the Congress when such a recommendation has been approved by three-fourths of the members present at the Congress.

(8) MEETING OF THE ASSOCIATION

The annual general meeting of the Association shall be styled as the Congress. The time and place for the next meeting will be determined by the Congress.

The President shall lay before the Congress report of the work for the past year as also a statement of accounts.

(9) CHANGES IN STATUTES

The statutes can be changed only by the Congress. Two-thirds majority of those present would be necessary for the purpose. The change may be proposed by any member who must notify the Central Executive in writing at least one month before the Congress meets. The Central Executive on receipt of such notice shall circulate it to all members at least 14 clear days before the Congress meets.

(10) SUBSCRIPTIONS

Each member has to pay to the Association an annual subscription of Rs. 5. This amount is paid through the President of the branch society to which he belongs. The subscriptions for the branch societies shall be independently fixed by them taking into consideration the contribution to the Association.

(11) PRIVILEGES

Members have the right of attending all meetings of all the branch societies, but shall not have the right to vote in any branch society except their own. Every member shall be invited by the Congress and shall have the right to vote and to be elected.

(12) DISSOLUTION

The dissolution of the Association shall only be effected by the Congress with an attendance of at least two-thirds of the total number of members of the Association and by a three-quarters majority of those present. The

meeting which resolves upon the dissolution shall also determine the disposal of the Association's property. Should there be no quorum the decision shall be made at a second meeting which may be held within a week by the majority of those present.

Dr. G. Bose moved and Mr. Malkani and Mr. H. Bhattacharya seconded that the draft constitution be accepted. The resolution was carried unanimously.

The committee further suggested that the Association when formed should start a Journal of Psychology. The suggestion was put from the chair and accepted by the house.

OFFICE-BEARERS.

President—Dr. N. N. Sengupta, M.A., Ph.D.

Secretaries—Mr. Haridas Bhattacharya, M.A., P.R.S., Reader,
University of Dacca.

Mr. Gopeswar Pal, M.Sc., Lecturer, University of
Calcutta.

Members of the Central Executive.—

Dr. Sisirkumar Maitra, Benares.

„ James C. Manry, Allahabad.

Council to the Journal.—

Principal Michael West, Training College, Dacca.

Dr. Girindrashekhar Bose, M.B., D.Sc., Calcutta.

Board of Editors.—

N. N. Sengupta—Calcutta University.

Owen Berkeley-Hill—European Mental Hospital, Ranchi.

Haridas Bhattacharya—Dacca University.

J. M. Sen—D. H. Training College, Calcutta.

G. C. Chatterjee—Government College, Lahore.
